

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

an insulating film comprising silicon oxide on an insulating surface,

wherein the insulating film includes halogen at a concentration of $5 \times 10^{20} \text{ cm}^{-3}$ or less and carbon at a concentration of $5 \times 10^{19} \text{ cm}^{-3}$ or less which are detected by second ion mass spectroscopy.

2. A device according to claim 1, wherein the halogen is chlorine.

3. A device according to claim 1, wherein the halogen is fluorine.

4. A device according to claim 1,

wherein the insulating film includes carbon at a concentration of $1 \times 10^{18} \text{ cm}^{-3}$ or less which is detected by the second ion mass spectroscopy.

5. A device according to claim 1,

wherein the insulating film includes halogen at a concentration of $1 \times 10^{17} \text{ cm}^{-3}$ or more which is detected by the second ion mass spectroscopy.

6. A device according to claim 1,

wherein the insulating film is a gate insulating film.

7. A device according to claim 1,

wherein the insulating film is an insulating film in a thin film transistor.

8. A device according to claim 1,

wherein the insulating film covers an even surface over a glass substrate.

9. A device according to claim 1,

wherein the insulating film is formed by plasma chemical vapor deposition using an organic silane.

10. A device according to claim 9,

wherein the organic silane comprises at least a material selected from the group consisting of $\text{Si}(\text{OC}_2\text{H}_5)_4$, $\text{Si}_2\text{O}(\text{OC}_2\text{H}_5)_6$, $\text{Si}_3\text{O}_2(\text{OC}_2\text{H}_5)_8$, $\text{Si}_4\text{O}_3(\text{OC}_2\text{H}_5)_{10}$ and $\text{Si}_5\text{O}_4(\text{OC}_2\text{H}_5)_{12}$.

11. A semiconductor device comprising:
a crystalline semiconductor island on an insulating surface; and
an insulating film including silicon oxide to cover the crystalline semiconductor island,
wherein the insulating film includes halogen at a concentration of $5 \times 10^{20} \text{ cm}^{-3}$ or less and carbon at a concentration of $5 \times 10^{19} \text{ cm}^{-3}$ or less.

12. A device according to claim 11,
wherein the concentrations of halogen and carbon are detected by secondary ion mass spectroscopy.

13. A device according to claim 11, wherein the halogen is chlorine.

14. A device according to claim 11, wherein the halogen is fluorine.

15. A device according to claim 11,
wherein the insulating film includes carbon at a concentration of $1 \times 10^{18} \text{ cm}^{-3}$ or less.

16. A device according to claim 11,
wherein the insulating film includes halogen at a concentration of $1 \times 10^{17} \text{ cm}^{-3}$ or more.

17. A device according to claim 11,
wherein the insulating film is formed by plasma chemical vapor deposition using an organic silane.

18. A device according to claim 17,
wherein the organic silane comprises at least a material selected from the group consisting of $\text{Si}(\text{OC}_2\text{H}_5)_4$, $\text{Si}_2\text{O}(\text{OC}_2\text{H}_5)_6$, $\text{Si}_3\text{O}_2(\text{OC}_2\text{H}_5)_8$, $\text{Si}_4\text{O}_3(\text{OC}_2\text{H}_5)_{10}$ and $\text{Si}_5\text{O}_4(\text{OC}_2\text{H}_5)_{12}$.

19. A semiconductor device including at least a thin film transistor comprising:
a crystalline semiconductor island on an insulating surface;
a silicon oxide film over the crystalline semiconductor island; and
a conductive film including at least one of aluminum, titanium, and titanium nitride, said conductive film being formed on the silicon oxide film,
wherein the silicon oxide film includes halogen at a concentration of $5 \times 10^{20} \text{ cm}^{-3}$ or less and carbon at a concentration of $5 \times 10^{19} \text{ cm}^{-3}$ or less.

20. A device according to claim 19,
wherein the concentrations of halogen and carbon are detected by secondary ion mass spectroscopy.

21. A device according to claim 19, wherein the halogen is chlorine.

22. A device according to claim 19, wherein the halogen is fluorine.

23. A device according to claim 19,
wherein the silicon oxide film includes carbon at a concentration of $1 \times 10^{18} \text{ cm}^{-3}$ or less.

24. A device according to claim 19,
wherein the silicon oxide film includes halogen at a concentration of $1 \times 10^{17} \text{ cm}^{-3}$ or more.

25. A device according to claim 19,
wherein the silicon oxide film is formed by plasma chemical vapor deposition using an organic silane.

26. A device according to claim 17,
wherein the organic silane comprises at least a material selected from the group consisting of $\text{Si}(\text{OC}_2\text{H}_5)_4$, $\text{Si}_2\text{O}(\text{OC}_2\text{H}_5)_6$, $\text{Si}_3\text{O}_2(\text{OC}_2\text{H}_5)_8$, $\text{Si}_4\text{O}_3(\text{OC}_2\text{H}_5)_{10}$ and $\text{Si}_5\text{O}_4(\text{OC}_2\text{H}_5)_{12}$.

27. A semiconductor device including at least a thin film transistor comprising:
a crystalline semiconductor island on an insulating surface;
a gate insulating film including silicon oxide on the crystalline semiconductor island;
and
a gate electrode on the gate insulating film,
wherein the gate insulating film includes halogen at a concentration of $5 \times 10^{20} \text{ cm}^{-3}$ or less and carbon at a concentration of $5 \times 10^{19} \text{ cm}^{-3}$ or less.

28. A device according to claim 27,
wherein the concentrations of halogen and carbon are detected by secondary ion mass spectroscopy.

29. A device according to claim 27, wherein the halogen is chlorine.

30. A device according to claim 27, wherein the halogen is fluorine.

31. A device according to claim 27,
wherein the gate insulating film includes carbon at a concentration of $1 \times 10^{18} \text{ cm}^{-3}$ or less.

32. A device according to claim 27,
wherein the gate insulating film includes halogen at a concentration of $1 \times 10^{17} \text{ cm}^{-3}$ or more.

33. A device according to claim 27,
wherein the gate insulating film is formed by plasma chemical vapor deposition using an organic silane.

34. A device according to claim 33,
wherein the organic silane comprises at least a material selected from the group consisting of $\text{Si}(\text{OC}_2\text{H}_5)_4$, $\text{Si}_2\text{O}(\text{OC}_2\text{H}_5)_6$, $\text{Si}_3\text{O}_2(\text{OC}_2\text{H}_5)_8$, $\text{Si}_4\text{O}_3(\text{OC}_2\text{H}_5)_{10}$ and $\text{Si}_5\text{O}_4(\text{OC}_2\text{H}_5)_{12}$.